

MORPHOLOGICAL DESCRIPTION OF THE LARVA OF OREOPASITES VANDUZEEI COCKERELL

(Hymenoptera: Anthophoridae)

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This paper represents the first description of the larva of a member of the Ammobatini, a tribe composed entirely of parasitic bees. *Oreopasites*, the only New World genus belonging to this tribe, is parasitic on the panurgine bees of the genus *Nomadopsis* Ashmead.

The specimens upon which this paper is based were recovered from the cells of *Nomadopsis anthidius* (Fowler), a large species, which gathers pollen from various species of *Trifolium*. The identification of the parasitic bee larvae was made by inference from the great number of large-sized *Oreopasites vanduzeei* Cockerell, which were found at the nesting site of the host bee.

Three of the parasitic larvae were exhumed and preserved. One is a large-sized, yellowish specimen, which, on the basis of the author's experience with other bee larvae, is obviously the hibernating form. One, slightly larger, is whitish and is the fully-grown larva which has not yet defecated and assumed the hibernating appearance. In lieu of a more appropriate name for this form, it will be called the "white larva" because of its color, although body form is just as striking a difference between it and the hibernating one. The third larva is the first instar.

In the description of these three larvae, the morphological terms and the study techniques which were employed by Michener (1953) have been adopted for the most part.

Because Michener (*ibid.*) in his comprehensive study of bee larvae was not fully able to discern between hibernating and pre-hibernating larval forms, it is perhaps worth-while to describe and to discuss the differences between them for this species. These dissimilarities are apparently due to several reasons, one of the main ones being the elimination of the fecal material by the larva as it enters the hibernating stage. The material consists of the undigestable portion of all the pollen which the individual has consumed during the larval stage. The defecation of such a large quantity undoubtedly causes the very marked difference between the body

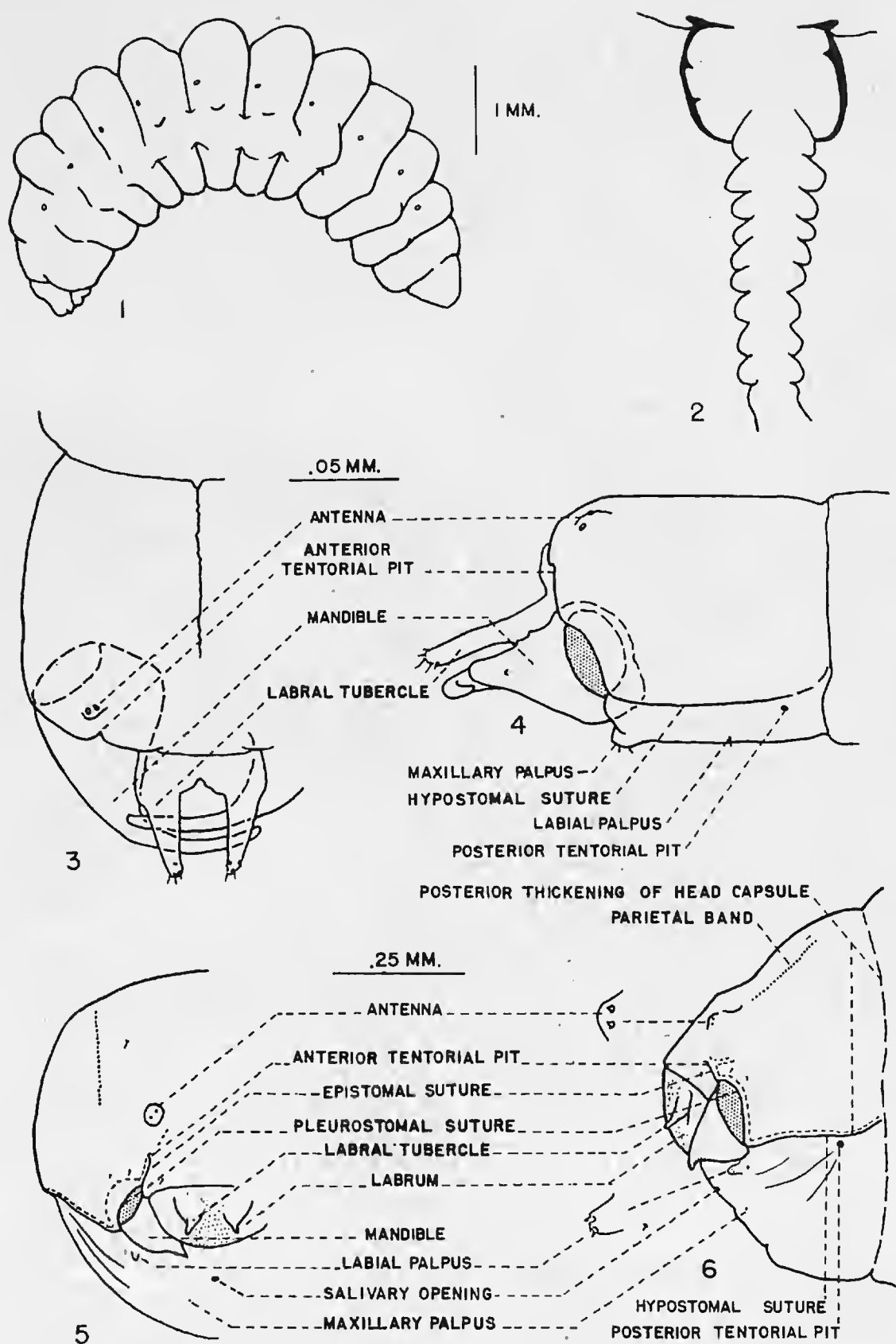
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shape of the two larvae, and may account for the "white larva's" having a smooth integument while the hibernating form has a finely wrinkled one. Other differences between these two are probably associated with physiological changes in the organism as it enters diapause and prepares to withstand the adverse winter weather conditions.

The following is a summarization of the differences between these two larvae. In the "white larva" the head capsule is in general less sclerotized, as is evidenced by its comparative lack of rigidity and lighter coloration. The hibernating larva has several folds (figs. 5 and 6) on the lateral portions of the labiomaxillary region, which may be mistaken for a suture separating the two component mouthparts. Such folds are absent in the "white larva," so that it is assumed that these folds are superficial, being due to the reduction of the body content after defecation. As is stated above, the body integument of the "white larva" is smooth, whereas that of the hibernating form is finely wrinkled. In color the "white larva" is translucent white and not opaque with a yellowish hue as is the hibernating one. Intersegmental lines are very shallow in the "white larva," while they are deeply incised in the other. The "white larva" is subcircular; the hibernating form, seen in cross-section through the apices of the dorsolateral tubercles, is strongly dorsoventrally compressed, so that the body at its largest diameter is nearly twice as wide as high. The shape of the dorsolateral tubercles differs between the two forms; this dissimilarity is discussed in the description of the larva. The main differences between the two larval forms are those listed above. In all other major respects the larvae are identical and are described together below as the mature larva.

DESCRIPTION OF MATURE LARVA

Head: Capsule with integument very lightly sclerotized, bearing few scattered setae. Anterior and posterior tentorial arms very short in both hibernating and "white" larvae; remaining portion of tentorium absent. Posterior tentorial pits situated slightly below hypostomal thickening. Posterior thickening of head capsule, except near connection to hypostomal thickening, very faint, so that boundary between head and body difficult to distinguish; near hypostomal suture posterior thickening pronounced, though somewhat less so than hypostomal thickening, and running in the same direction as, and as a continuation of, hypostomal thickening. Hypostomal thickening and corresponding suture pronounced. Pleurostomal thickening pronounced. Epistomal thickening and corresponding suture between precoilae and anterior tentorial pits weak, though evident; epistomal thickening between



EXPLANATION OF FIGURES

OREOPASITES VANDUZEEI Cockerell

Fig. 1, hibernating larva, lateral view; fig. 2, spiracle; fig. 3, first instar, dorsal view of head; fig. 4, first instar, lateral view of head; fig. 5, hibernating larva, front view of head; fig. 6, hibernating larva, lateral view of head.

anterior tentorial pits obscure, perhaps extending upward and running immediately mesad of each antenna; epistomal suture absent. Antennae low convexities. Parietal bands faint, clearly seen only on cleared head capsule. Labrum protruding (in drawn specimen labrum has been somewhat flattened and tubercles abnormally directed ventrad instead of anteriad as in "white larva"); integument with minute spicule-like projections and apically with scattered sensilla; labral tubercles long, attenuate. Hypopharynx united with surrounding maxillae and labium so as to be difficult to definitely delineate, except perhaps for shallow, unsclerotized groove in approximate position of hypopharyngeal groove; integument without spicules or sensilla. Salivary opening circular, not labiate, and situated somewhat below supposed hypopharyngeal groove. Mandibles at base stout; at apex pointed, curved inward, and with upper and lower margin coarsely serrate; mandibles nearly identical to those of *Nomada fowleri* Cockerell as drawn by Michener (1953:1069) except dentition on cusp lacking. Maxillae so fused with surrounding mouthparts as to be impossible to delineate, though evident apically as slight, palpus-bearing convexities, which are weakly sclerotized in overwintering larva, and which lie immediately below mandibles; palpi small but distinct, each bearing two apical sensilla; each maxilla with single sensillum laterad of palpus. Labium exceeded by hypopharynx, not divided into prementum and postmentum; palpi completely lost except apparently for two sensilla, each of which is in approximate position of palpus.

Body: Integument minutely spiculate. Intrasegmental lines absent. Dorsolateral tubercles in "white larva" very low, scarcely noticeable toward posterior end of abdomen; in hibernating larva apex of tubercles as high as elevation of body at median line, so that body surface, between apices of tubercles on same segment, straight. Spiracular atrium protruding above body wall, with rim, and with rows of small teeth on inner surface; peritreme flat or perhaps slightly concave.

It may be of some interest to note that of the three spiracles of mature larvae to be examined, one, that of the hibernating larva, contained in the atrium a single pollen grain of *Trifolium* and the two from the "white larva" contained in their atria three and four pollen grains. While the atrial opening is large enough to allow the pollen grains to enter, the collar of the primary tracheal opening is sufficiently small to exclude the grains from entering the subatrium.

On the basis of the morphology of the mature larva, *Oreopasites* seems to fall well within the *Neopasites-Nomada-Epeolini* group, a group which, though appearing unrelated in adult characteristics, has larvae which are very similar to one another as reported by Michener (1953). The larva of *Oreopasites* shares with this group the following characters which are listed by Michener (1953:1066) for the group: salivary opening reduced, without lips; antennal papillae reduced; mandibles acute at apices. Within

this group of parasitic bees, *Oreopasites* seems to be most similar to *Nomada* as is shown by the following list of characters which the two genera hold in common: head capsule weakly sclerotized, broadly attached to body; posterior thickening of head capsule weak; tentorial pits weak; mandibular shape and dentition (except on cusp); labiomaxillary region reduced; spiracular shape; and over-all body shape.

Oreopasites differs from the above mentioned group in the peculiar position of the posterior tentorial pits; the unspiculate hypopharynx; the lack of dentition on the mandibular cusp (also lacking in the Epeolini), though the mandible is otherwise identical with that of *Nomada*; in the apparently even more reduced labiomaxillary region, including the near loss of the labial palpi; and from *Nomada* and *Neopasites* in the presence of atrial spines which, moreover, are quite different from those of the Epeolini.

While the morphology of the mature larva of *Oreopasites* is of particular interest because of the light it throws on the phylogenetic relationships of the genus (and the tribe) to other groups, the morphology of the first instar is of interest because of the adaptation of the first instar for killing the egg or perhaps young larva of the host bee.

The first instar is markedly different from the mature larva. Unfortunately, a complete description of the first instar is impossible because of the specimen's extremely small size (length 1.1 mm.) and because the specimen was about to molt, so that portions of the integument of the second instar are visible and thus obscure the structures on the first instar. However, a brief description is given and the head has been drawn (figs. 3 and 4), so that at least some idea of the larva can be gained.

The head is elongate, more prognathous than that of the mature larva. The labral tubercles are very long, extending anteriorly well beyond the closed mandibles. The mandibles are sickle-shaped and beset with short teeth on their inner edge. The antennae, maxillary palpi, and labial palpi have the same number of sensilla as the mature larva. The posterior tentorial pits are in the same position as in the mature larva. The post-cephalic region is slender, uncurved, and not grub-shaped.

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